

Solution Stoichiometry Practice

1. What volume of sea water that is 0.0551 mol/L $\text{Mg}^{2+}_{(\text{aq})}$ is required to prepare 1.0 kg of $\text{Mg}(\text{OH})_2$?
2. Write the net ionic equation that occurs when 30.00 mL of 0.248 mol/L $\text{Cr}(\text{NO}_3)_3$ and 40.00 mL of 0.252 mol/L K_2S are mixed. Calculate the mass of precipitate that forms.
3.
 - (a) Write the balanced equation, the total ionic equation, and the net ionic equation to represent the reaction that occurs when $\text{Ba}(\text{OH})_{2(\text{aq})}$ is mixed with $\text{HCl}_{(\text{aq})}$.
 - (b) What volume of 2.88 mol/L $\text{Ba}(\text{OH})_2$ will react completely with 25.0 mL of 4.00 mol/L HCl ?
 - (c) What is the concentration of chloride ion after this reaction is complete?
 - (d) In what two ways can this reaction be classed?
4. Calculate the number of mL of 2.00 M HNO_3 required to react with 216 g of Ag according to the following equation:
$$3 \text{Ag}(\text{s}) + 4 \text{HNO}_3(\text{aq}) \rightarrow 3 \text{AgNO}_3(\text{aq}) + \text{NO}(\text{g}) + 2 \text{H}_2\text{O}(\text{l})$$
5. Calculate the mass of AgCl formed when an excess of 0.100 M solution of NaCl is added to 0.100 L of 0.200 M of AgNO_3 .
6. A sample of impure sodium chloride weighing 1.00 g is dissolved in water and completely reacted with silver nitrate solution. The dried precipitate of AgCl has a mass of 1.48 g. Calculate the percentage of NaCl in the original sample.

Challenge Questions:

7. To neutralize the 10.0 mL of 18.0 M H_2SO_4 that was accidentally spilled on a lab bench top, solid sodium bicarbonate was used. The container of sodium bicarbonate was known to weigh 155.0 g before use and was determined to weigh 144.5 g after use. The reaction that neutralizes sulfuric acid is:
$$\text{H}_2\text{SO}_4(\text{aq}) + 2 \text{NaHCO}_3(\text{s}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2 \text{CO}_2(\text{g}) + 2 \text{H}_2\text{O}(\text{l})$$
Was enough sodium bicarbonate used? Calculate the limiting reactant and the maximum yield (g) of sodium sulfate.
8. Barium nitrate and potassium sulfate solutions react to form a precipitate. What is the precipitate? How many mL of 0.40 M $\text{Ba}(\text{NO}_3)_2$ solution are required to precipitate completely the sulfate ions in 25 mL of 0.80 M K_2SO_4 solution?
9. What mass of silver chloride can be precipitate from a silver nitrate solution by 200 mL of a solution of 0.50 M CaCl_2 ? Keep in mind what a realistic percentage yield is, when answering this question.